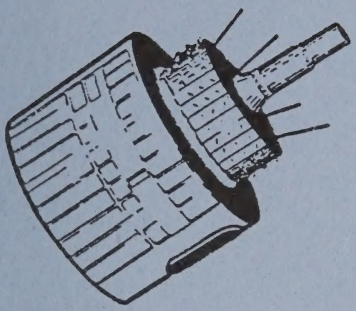
NEWSLETTER No. 10



REMOTE IMAGING GROUP

SEPTEMBER 1987

REMOTE IMAGING GROUP (R. I. G.)

NEWSLETTER No. 10 SEPT 1987

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Editorial and Secretaries page

Please let me open by apologising for the late arrival of this newsletter, a basic lack of material to publish and a very busy professional life at the moment are the main reasons. The next issue will go out during December regardless so all input by mid November at the very latest please.

The RIG's quest for blanket licencing approval from the DTI for RIG members now seems very close. The intent is to provide, twice yearly, a list of members to the DTI who will then give the necessary approval. It is not expected that the DTI will issue any documentation to members so the appropriate correspondence will be printed in this newsletter. Naturally there will be members who do not wish their details to be forwarded to the DTI so at the membership renewal time, Jan 88, members will be asked if they object to RIG giving this information to the DTI.

Our supplier of superior RF products, DARTCOM, have now had to register for VAT and correspondingly some of our prices, see 'RIG Shop Corner', have had to be increased. Please read closely the instructions for payment. Its one of the costs of being successful.

On the subject of FAX machines, Adrians series of articles on FAX machines comes to a close in this edition and members may be wondering where to locate such devices on which to base the development, turn to the members ads page, first come first served!

I've received a letter from Jeff Wallach, who together with others have formed the Dallas Remote Imaging Group (DRIG), I wonder where the idea for the name came from? Anyway their intentions are in many respects similar to ours and we shall be arranging a reciprocal arrangement for newsletter material. I look forward to reprinting the relevant articles.

The Russians have been busy again, with the launch of at least two new satellites relevant to our interests: Cosmos 1869 and Meteor 2-16, since our last edition. A substantial number of articles in this issue cover their activities and it is a credit to such contributors that they can offer such a wealth of detail for the benefit of the membership.

See you again in December,

Phil, G8XTW

CHAIRMANS REPORT.

September is already with us, and probably gone by the time you read this. I must confess that this summer I haven't received anywhere near as many satellite pictures as I usually have in past years. This is due to the long transfer of equipment out of the old shack in the old house next door into the present shack. I haven't got the time clocks etc installed so its not automatic yet and the only frames received are the ones I receive manually at the weekends. I do find this leaves me at a loss and I must get this work completed. The trouble is that there is so much other work to be done, even Henry has to cut the lawn and do other essential duties. I just don't get the time, but you've heard it all before. I'm sorry that the Newsletter is a bit late, some of it is due to myself, but its mainly because of lack of material to publish, so get your pens going!

I had a telephone call from India asking me to let them have orbit details so they could record the signals from both NOAA and MET as they pass over that area. Perhaps we might see the results in later Newsletters if the tapes are OK. This raises the point that many of our members live outside the UK even outside Europe. Now perhaps we could build up a library of good passes of exotic places and perhaps the less exotic. It would be nice to get tapes so that we can get hard copy from them and even duplicate them for other members use.

Somewhere along the line I have been given the impression, rightly or wrongly, that it is standard practice to tape the high resolution signal, decode it, and remodulate it on a 7200Hz tone which is then recorded. It is then replayed at 1/3rd speed to give a standard 2400Hz signal which is then displayed on standard equipment. Now if that is correct I bet there would be a great number of you looking for a copy. If any of you have any details of this system please let me know.

One thing our Newsletter does seem to lack is news. The Committee and myself are trying to get contacts in the various operational organisations to keep us up to date with the goings on, not just in America, but hopefully in ESA and perhaps even in the other organisations. If you have contacts in the right places please let us know, you may have better ones than we have.

While I was at the AMSAT colloquim I had a long chat with Mike Christieson. One thing that emerged was that his Company "Feedback" use an aerial called a quadrafiliar for 137Mhz. Some details of this aerial are published in the latest edition of the VHF/UHF Handbook from the RSGB. The material was inserted by Roy Powers and goes back a fair while.

I eventually contacted Roy who said he would look into it for me and see if he could let me have details. Polar diagrams are given in the article and the main thing I noticed was the lack of nulls even at low elevations. The proof of the pudding is in the ..... picture!

While we are talking of aerials both my 1700Mhz Yagi and Peter Braziers Quadloop aerial were tried at Woburn and produced very good pictures. My Yagi at 25 elements was the weaker but Peters Quadloop, with I believe 30 elements, gave a signal only just a fraction down on the 1 metre dish, but remember the RIG receiver is very nearly flattened by a signal like that, so perhaps it wasn't as good as it seemed except it certainly gave very good pictures. This leads me on to the possibility of my selling a Microwave Modules downconvertor. It works well but it is not as good as the DARTCOM downconvertor because it only has a 64535 RF stage. It would suit anybody with a dish and pre-amp at the feed, so any reasonable offer?

I did find time to entertain James Brown a few weeks ago at my house, he rang one weekend to say he was coming on the Wednesday at the start of harvest, not one of the best times for me, but I would always find time for James. On the Tuesday the combine harvester was on the go only to have a clutch breakdown at 4.00 pm., it rained at 5.00 pm but we stripped the clutch down and found another clutchplate which we then reassembled on Wednesday morning and just had time to have a bath and clean up (I needed it) before the Right Reverend turned up. There must have been a bit of Divine planning there somewhere because if it hadn't rained the previous day I would have lost some very valuable time but all was well and a very enjoyable day was had by all. After his wife had seen my shack I think she will be pleased that James is not as bad as Henry. Not that I want to become something to be compared with because most of you will be tidier than I am, but I do have to keep writing these Chairman's Reports!

Henry is still keeping the Gasfet manufacturers in business. The MGF 1402 is kaput! This time I believe it died because I exceeded the cumulative soldering time. The source bypass capacitors were an old type and were mechanically breaking up so I removed the device to insert some new ones but when I reinstalled it it didn't work. A phone call and my flexible friend resulted in a new device the next morning. Again very carefully inserted and alls well. The moral seems to be "if it works, leave it alone!"
I must try and put that into practice.

After all his work organising the rallies, Peter Brazier has taken on the job of Treasurer and is getting it sorted to his liking, but this unfortunately leaves us without a Rally Organiser, even though Peter and Phil are still doing it between them as a temporary measure.

Peter has told us that we must get someone else to do it in the near future. They will continue to help, but not to do all the work. We want to build up more of RIG's own equipment so that the committee don't have to extract their own equipment for rallies, also make it as self-contained as possible so that its easy and simple to get set-up. A Rally Organiser is not a job to be taken on lightly but someone with a little dedication could find it a very interesting job, although with an early start on about 6 days per year. Anyway give it some thought and don't hesitate to ask for further details, perhaps even suggest someone else as a possible candidate.

While at the AMSAT colloquium I did have the pleasure of meeting YT3MV (ex YU3UMV) Matjaz Vidmar. We had a long chat and I did mention that in his early articles in VHF Communication he did say that his Framestore System was also going to be able to take the HRPT as well. I gather he never completed this side of it. I am certain that several members were looking forward to that section. His main current activities are in the D.B.S. line and his articles are being published in VHF communications at present.

I also understand that Robert Popham is finishing his current role next year and at present I do not know who his successor will be. I am certain that we all shall miss having Bob at the top in America and I am sure you would all want me on your behalf to thank him for all his help in the past and wish him well for the future. I am sure that if he is ever in this country again we shall see him.

At a recent committee meeting it was mentioned that our membership had reached 967 and no doubt should be over the thousand by the time the newsletter is posted. I think that this no mean achievement in two and half years and is of great credit to all the committee and their hard work. May we ever look to the future, maintaining these standards, where possible, improve our services to you - our members. Please help us in whatever way you can.

I think that's about all for this quarter there's not much on the appointments calendar at the moment but I do hope to see you all next year at the rallies,

Till the next time,

Best wishes

Henry

NOAA 10 by David Bailey

Most of us in R.I.G. concern ourselves with the reception and display of the APT pictures from the NOAA satellites, but there is much more to them than this, so I thought it would be interesting to take a look at the NOAA 10, and in particular at the sensors on the scanning radiometer, the source of the APT images.

NOAA 10 is a spacecraft of the Advanced Tiros-N (ATN) series, and was launched at 1552 gmt on the 17th September, 1986; the launch vehicle, a refurbished Atlas E ballistic missile, having done something much more useful than its originally intended purpose.

The prototype Tiros-N was launched in October 1978, and the following operational satellites were given the names NOAA-A, NOAA-B, etc; once in orbit they followed the familiar numerical sequence: NOAA-6,7, and so on. It was NOAA-G that came to be NOAA-10. NOAA-B, incidentally, because of a duff launch, never made it into orbit, and so NOAA-C became NOAA-7. Tiros-N series satellite NOAA-D was put into storage; this, and three more of the present Advanced Tiros-N series are to be launched before significant changes appear in the instrumentation of the polar spacecraft. The launch order for these four satellites is NOAA-H,D,I,J, So, if all goes according to plan, when NOAA-D is bought out of mothballs and cast into the heavens, it will be known as NOAA-12.

The launch of NOAA-H has been delayed from October this year to February next; one of the instruments is to be changed, and the bearings of a scanning mirror on one of the other devices require attention.

The Argos Data Collection System.

This system aboard the NOAA spacecraft is supplied by France, and is used to collect weather information from around the world; balloons, buoys, and other platforms such as weather stations in remote locations.
Not only does the satellite record the data transmitted by the platform, it can also fix its position by a doppler to an accuracy of about 5km. the uplink frequency from the platform to the satellite is 401.65 MHz at 3 watts.

The Argos system aboard the polar orbiters is especially useful in the Arctic and the Antarctic; these regions being out of sight of the geostationary weather satellites, and has I believe, even been used to track the movements of Polar Bears!

Search and Rescue (SARSAT)

This facility is provided by Canada and France, and was first carried aboard NOAA-8; a compatible system is also aboard some USSR navigational satellites, and is known as COSPAS.

The SARSAT payload receives distress signals from aircraft or ships, and retransmits it to ground stations known as Local User Terminals (LUTs). The last count was 9 LUTs: three in the USA and three in USSR, and one each in Canada, France, and Norway.

Doppler, of course, is used to establish the position of the source of the distress signal, and the information is then passed from the LUT to a mission control centre, who then alerts the appropriate Rescue Coordination Centre.

Aircraft have fixed devices known as ELTs - Emergency Locator Transmitters, triggered by crash impact, and ships carry emergency Position Indicating Radio Beacons; these EPIRBs are activated by water. Both can be kicked into life manually.

ELTs and EPIRBs operate on 121.5 MHz and 243MHz. The accuracy of the position fixing is at best about 10km, because of the low power (75mW) and frequency instability. There are however, experimental beacons that operate at 406MHz, and these allow an accuracy down to 2km.

The SARSAT downlink to the LUTs is at 1544.5 MHz.
Unfortunately, the SARSAT system is best at false alarms, the false alarm rate is a horrific 98 percent. ELTs have been known to go off in the mail; next time you receive pictures from NOAA-10 in the morning, at that very moment it could be tracking your postman down the road.

Space Environment Monitor (SEM)

This package monitors the earth's radiation belts and records the results of solar activity. Its uses include the prediction of ionospheric conditions and their effect on HF radio, and the radiations levels affecting high flying aircraft and manned space missions.

Tiros Operational Vertical Sounder System (TOVS)

This normally consists of three separate instruments, the High Resolution Infrared Radiation Sounder Mk2 (HIRS/2); the Microwave Sounding Unit (MSU), the Stratospheric Sounding Unit (SSU). The SSU is provided by the UK Met Office, but on the NOAA-10 the SSU is flying as a dummy.

The TOVS as a whole detects and measures the energy radiated by the earth's atmosphere, and these measurements enable the temperature gradient from the earth's surface to the upper stratosphere to be determined.

Earth Radiation Budget Experiment (ERBE)

This experiment is aboard NOAA-9 and NOAA-10. About 30 percent of the sun's energy falling on the earth's atmosphere is reflected back out into space; the remainder is absorbed by the various gases in the atmosphere and also by the earth's surface. This absorbed energy is then reradiated, at the longer infrared wavelengths. All this coming and going of energy and the balance between the two is known as the earth's Radiation Budget. The ERBE measures the various energy components at the top of the atmosphere and provides average monthly figures.

Advanced Very High Resolution Radiometer (AVHRR)

As briefly mentioned earlier, some of the sun's incident energy is reflected back into space, and the remainder is absorbed and then reradiated. The bulk of the sun's radiation lies between the wavelengths 0.15um and 3.0um (visible light), and the energy radiated by the earth and atmosphere is at the infrared wavelengths between 9 and 50um. It is the temperature of the radiating body that accounts for the difference; wavelength is inversely proportional to temperature. Along the spectrum, at some wavelengths the reradiated energy is almost totally absorbed by individual gases in the atmosphere (but then radiated once again at an even longer wavelength), and at other wavelengths there is just about no absorption. It is, by the way, this absorption and reradiation of energy at specific wavelengths by specific gases, and knowledge of the vertical distribution of these gases in the air that enables the TOVS to determine the atmosphere's vertical temperature profile.

These portions of the spectrum where there is no absorption are called windows, and the AVHRR looks through them to sense the reflected visible light and the reradiated infrared. (IR). The four main windows are centred around 0.7um 3.5um 9.0um and 11um.

The optical end of the AVHRR is an 8 inch diameter Cassegrainian telescope with a beryllium scanning mirror driven by a 360 rpm motor. The received radiation is filtered into the sensors associated with the four channels of the AVHRR. Channel 1,vis, 0.58 to 0.68um; channel 2, vis, near infrared, 0.725 to 1.0um; channel 3, IR, 3.55, to 3.93; channel 4, IR, 10.5, to 11.5um.

The amount of visible light received at the AVHRR depends upon what is known as the albedo of the reflecting surface. The word comes from ecclesiastical Latin and means "whiteness" A few typical albedo's are: white sand, 90%; large cumulonimbus clouds, 92%; week old snow, 59%; sand, 27%; coniferous forest, 12%; sea, 8%.

For any of the AVHRR IR channels, the reradiation will be greater the warmer the emitting body is; there will be little radiation from a cloud to a great height, and it will appear white on the IR images, whereas the Sahara desert, for instance will appear as a very dark area.

The separate images from all the AVHRR channels are available via the High Resolution Picture Transmossion (HRPT) downlink on 1698MHz, with a resolution of 1km. The APT downlink is two channels on 137.5MHz, and the resolution is to 4km. During the day time on APT, channels 2 and 4 are transmitted, with channels 3 and 4 at night.

Incidentally, the AVHRR images are used for much more than weather pictures; channels 1 and 2 combined give vegetation and agricultural assessments, and the IR channels can be used, for instance, to detect forest fires and volcanic activity, and to determine soil moisture content.

NOAA-10 carries 5 digital tape recorders. Apart from the "real time" transmissions via HRPT and APT, data from around the world is recorded aboard the satellite and played back when it comes in range of a Command and Data Acquisition (CDA) station. These are at Wallops Island in Virginia (see page 27), and at Fairbanks, Alaska. The French Met. space centre at Lannion also receives recorded data from the satellite.
The information from a CDA station is passed via geostationary satellite to NOAA 's central processing facilities in Siutland, Maryland. The command uplink frequency to NOAA-10 is 148.56MHz.

I hope that this look at NOAA-10 is of interest to those new to the hobby; writing this has made me realise how much more there is to learn about these complicated spacecraft.

The last of the present series of ATN satellites, NOAA-J, should still be operating in 1992. After that, three more satellites NOAA-K,L,M, are planned, and after that..... it's on to polar platforms.

MODIFICATION OF THE K401-B FOR METEOSAT/NOAA
PART THREE.

Based on circuits by Guy Martin G8NFU
Adrian Nash G4ZHZ

Construction and implementation of the modifications.

References:

Power supply circuit	- fig 2	RIG 9
Motor drive circuit	- fig 4a,4b	RIG 9
Video circuit	- fig 6	RIG 9

Fig 7 an idea for mounting the modifications on the rear cover of the K401-B

Fig 7 suggests how the modifications can be mounted on the rear cover of the fax machine. A cover for these circuits can be made out of aluminium and screwed onto the rear cover. Alternatively, the mods could be housed in a suitable cabinet with an interconnecting cable. The transformers can be mounted on each side of the panel with the PCBs holding PSU and video-MDU (motor drive unit) circuits. The 2N3055 on the power supply is mounted externally on a heatsink, in the place shown in fig 7. Wires going to this transistor can be taken on the other side of the panel and passed through a hole and grommet in the panel to the PSU PCB. The voltage regulators and TIP121s need to be bolted to the metal surface of the panel using mica washers. The panel is coated with hammerite paint, which can be removed using paint stripper. I used masking tape to produce a neat job. Any remaining marks of paint should be removed and the surface carefully sanded down to remove any burrs that might punch through the mica washers.

Mounting holes should be countersunk for the same reason. Torroidal trasnformers are shown but normal transformers can be used. In either case it is better (and more convenient) to mount one on each side.

Modification to the Fax electronics.

A few modifications need to be made to the K401s own electronics:

1. First disconnect VT2 base (top right hand corner of chassis.) It is the middle connection of the transistor.

2. Disconnect the base of VT21, a BC107. This will be found in the bottom of the right hand corner of the main PCB. Connect this via a 4K7 resistor to your plug going to the frame store (or other decoder); mark it start/stop control. When this connection is taken high, the helix motor starts.

3. Disconnect the + connection of C5, an 80uF electrolytic capacitor. This component is located at the top edge of the main PCB towards the centre.

4. Remove the electronic chassis. The whole unit comes free, and you will see that all connections to the mechanics frame are made by a multiway connector.

5. Now comes the harder bit.... The value of the synchronous motor phasing capacitors needs to be ajusted for 240 RPM (or if you were thinking of building a 120/240 dual speed machine, then you need relay switching to switch higher value phasing caps in for 120 RPM). The arrangement and values of the capacitors depends on the motor, and hence helix speed in use. Note the values of the phasing capacitors and alter them to the correct values using the following equation:

New value = old value X (old helix RPM/new helix RPM).

6. Wire the unused set of contacts on S3 (a DPDT), the Auto switch on the machine to the unused plug connectors, SK2/17 and SK2/22 on the multiway plug (SK2). The connections on the switch to use, are the middle connection and the bottom connection. Take wires from the connections on SK2 to the + end of C5. and Ov. A suitable Ov point is '32' on the main PCB. This switch now gives continuous printing or intermittent picture reception, with fast feed at start and a 30 sec. time out at the end.

7. The motor supply goes to pin 7 on RLE1 (normally open contact). The original 240v or 115v connection to RLE is removed. Connect the other connection of the MDU output to the Ov tap on the mains transformer (K401).

8. Connections between frame store, modifications and K401-B electronics. See fig 8.
A few hints on maintenance of the electrolytic machines:

Paper for the K401 can be purchased from Muirhead, the manufactures for £38 for six rolls. Type 'H' paper is best for satellite pictures, though all three grades of paper are the same price. The paper should last a long time, but may dry out if not kept sealed in its polyethene bag until used. It is best to keep paper in a cool place eg fridge or garage. However Muirhead will send a "free sample" roll (though not always a complete roll) for testing the machine.

You may find that you do not get very good prints. The following points may help:-

Writing edge: This needs replacing (Muirhead do have spares) if you

can't make out the scanned lines on the picture, ie the picture is a bit 'sploggy'). A good writing edge should give a nice crisp Hi-res prints.

Dirty helix: If marks are left on the white unmarked paper, then remove the helix and clean the helix blade with some damp electrolytic paper. This should be done regularly, particularly after reception of several very black prints. After the top paper guide has been removed, remove the helix by pinching the two lugs in the centre together.

Writing edge pitch; If you get uneven marking (or on marking at all) particularly at the right hand edge of the image, then ajust the little screw in the front cover of the machine (under a flag at the right hand side).

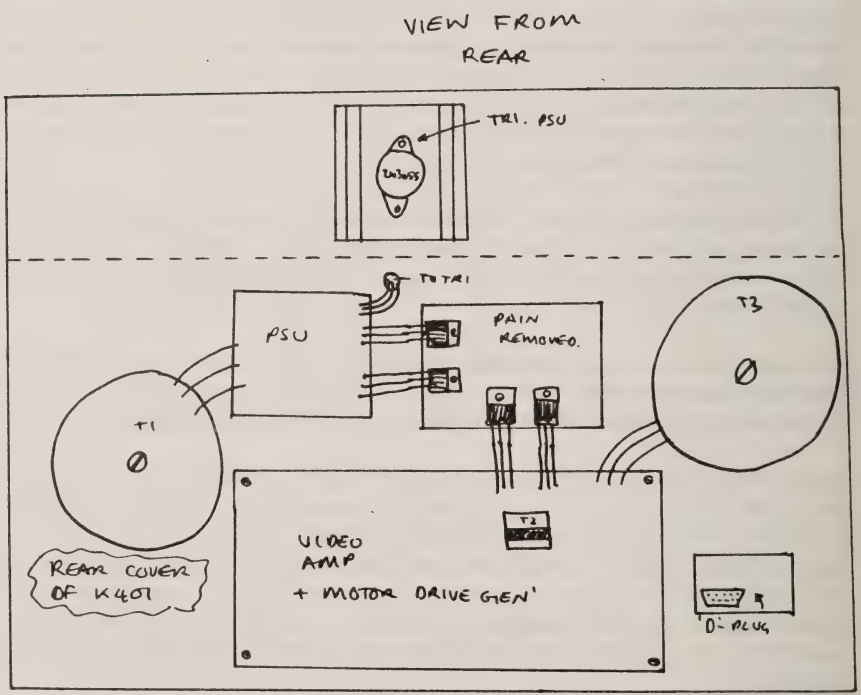


Fig 7: SUGGESTED LAYOUT OF PSU/MDU COMPONENTS - REAR VIEW

HINTS cont.

Heater bar temperature; If the prints do not seem to be very black, but yet increasing the marking power rips the paper, then turn up the temperature of the heater bar. This is done by ajusting a control on the rear of the heater bar. Don't turn it up to high; it is a sensitive control!

If the paper is being shredded by the helix, stop the machine immediately since this is bad for it. Add a resistor of fairly low value (eg 68 ohms) in series with a connection to the rheosat at the top left hand corner of the electronics chassis. Experimentation is really the only way to solve this problem.

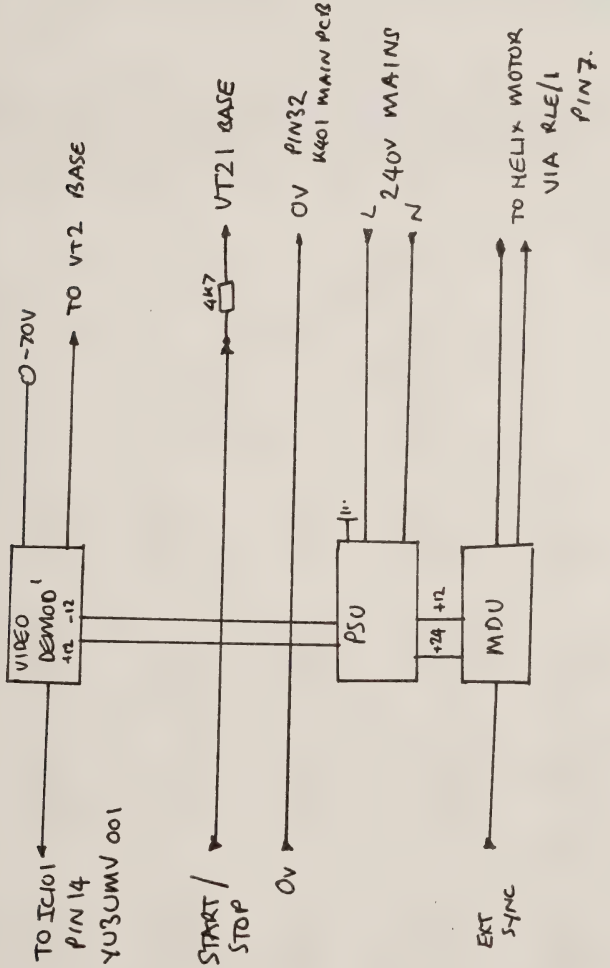


Fig 8: SUMMARY OF THE INTERCONNECTIONS

EDGE CODES OF OCEANOGRAPHIC COSMOS SATELLITES

G E Perry MBE
The Kettering Group

A reply from the USSR State Committee for Hydrometeorology and Control of Natural Environment to an inquiry by Dieter Oslender, a corresponding member of the Kettering Group, describes the numerical edge code on the APT images received from satellites of the Cosmos 1500 type.

It confirms that the number before the gradation wedge is the starting time in minutes [after midnight, Moscow Standard Time] and gives explanations for the other ten numbers which follow the wedge. A translation of the letter is being sought.

The number immediately below the wedge has been taken by some observers to be an identifier for a particular satellite but, since different values have been observed from the same satellite, this is clearly not so. Table 3.2 of the State Committee's reply sets out the permitted values that this number may take. These can be generated by running the following BASIC program.

```
10 X=62
20 FOR M=0 TO 3
30 K=16*M+1
40 FOR N=K TO K+7
50 PRINT X,X+1,
60 X=X+64
70 NEXT N
80 X=X+512:PRINT:PRINT
90 NEXT M
```

62	63	126	127	190
191	254	255	318	319
382	383	446	447	510
511				
1086	1087	1150	1151	1214
1215	1278	1279	1342	1343
1406	1407	1470	1471	1534
1535				
2110	2111	2174	2175	2238
2239	2302	2303	2366	2367
2430	2431	2494	2495	2558
2559				
3134	3135	3198	3199	3262
3263	3326	3327	3390	3391
3454	3455	3518	3519	3582
3583				

It can be shown that expressing these values as 12-bit binary numbers and selection of the appropriate bits determine the states of seven onboard instruments in the following format.

E1 in state I
E2 in state II
E3 in state I
E4 in state I
E5 in state I
Switch 1 is OFF
Switch 2 is ON

It is hoped, in due course, to publish a more complete account together with the BASIC program which has been written to produce the example.

I wish to express my thanks to Dieter Oslender for making the State Committee's reply available in its original form and to Les Currington, Adrian Buchan, Terry Weatherley and John Murray for supplying details of the edge codes.

MEMBERS ADVERTISMENT

SPECTRUM SOFTWARE:

Grant Dixon has prepared a program to show a map of the northern hemisphere on which the NOAA Satellite's GROUND track is plotted for any equator crossing value you care to enter. It will also indicate the approximate width of the weather picture as it would be displayed on a YU3UMV framestore or Fax machine. Information is supplied to enable the user to modify the scan boundaries and to rearrange the display to centre on his location.

Set of two programs on a cassette £7.50 inc. of postage and packing.

Orders to:
C. G. Dixon, Kyrles Cross, Peterstow, ROSS-ON-WYE, HR9 6LD.

RUSSIAN SATELLITE CORNER by Les Currington

Meteor 2-14 86.39A 137.85 MHz
Reasonable quality pictures are still being received during the afternoon, but large variations in brightness are taking place due to the faulty exposure control of the optical system.

Meteor 2-15 87.01A 137.85 MHz
Very high quality pictures are being transmitted, some of the cloud formation show incredible detail. It has been quite interesting to compare a similar pass of NOAA 9 with the much greater detail of the Meteors. At the time of writing Meteor 2-15 is in a descending mid morning pass.

Meteor 2-16 87.68A 137.4 MHz
On 18.8.87 Terry Weatherley reported a Meteor on 137.4 MHz at 14.46 GMT; a few calculations show it should be possible to get a pass at approximately 18.14 GMT; at 18.13 GMT a strong carrier was heard on 137.3 with a carrier similar to the Meteor IR. At 19.58 GMT a similar transmission was heard and tracked by beam to a mid Atlantic pass-but the new Meteor should have been out of range? At 7.50 GMT on the 19.8.87 a similar signal was heard on 137.3 MHz.

By this time the Kettering group under Geoff Perry M.B.E. had been in full alert, and all known Keplarian Elements of Meteors were being diligently printed out, Peter Wakelin who recently had just completed a tour of duty in the Falkland Islands was burning the midnight oil, and eventually came up with the answer. The signal on 137.3 MHz and the orbits times fitted in exactly with the very old Meteor 2-03. By comparing a computer print out of Meteor 2-16 and Meteor 2-03 data, both satellites were found to be in a similar orbit. It is possible that the old Meteor 2-03 may have been switched on by commands to the new Meteor 2-16.

On the 19.8.87 at 13.18 GMT Meteor 2-16 was received but with the addition of approximately 33 thin vertical black bars; at 15.02 GMT pictures were again received with vertical black bars, but after 2 minutes transmissions ceased. Transmissions were resumed one minute later but without the vertical bars. The exact number of lines was difficult to convert as they only showed in the cloud area. Since then good pictures have been received on 137.4 MHz.

By the time this is published transmissions may have been switched to the normal frequency of 137.85 MHz When fully commissioned Meteor will possibly take over from Meteor 2-14.

Cosmos 1869 87.062A 137.4 MHz
During the second week in July a new Cosmos Oceanographic Satellite was launched. the first pictures were visible, with data down one side; the pictures were subject to severe streaking and the data was not transmitted at the normal black level. After several days the picture swath was reduced and the radar instated.
Pictures received have arc of very poor quality and not up to the standard of the Cosmos 1500 series.

Cosmos 1766 86.55 A 137.4 MHz
Pictures are monitored quite frequently, but transmissions mostly cease after crossing the Arctic and switching off at the North ???

NEW RUSSIAN OCEANOGRAPIC SATELLITE by Adrian Buchan, G6ZOJ

On the 16 July '87 the Russians launched Cosmos 1869 into an 82.5 Deg 97.7 minute orbit. This spacecraft succeeds Cosmos 1766 which has been transmitting interesting Synthetic aperture radar pictures of the Baltic for the past year.

For the past few weeks from launch, Cosmos 1869 has been transmitting visable pictures and what I believe to be a passive mircowave sounder image side by side.

This microwave sounder is a much improved version of the first one seen on Cosmos 1766.
No synthetic aperture radar have been transmitted to date (3.8.87)

This series of satellites only transmit when in range of Moscow, they transmit at 240 lines a minute with a 2.4Khz subcarrier on a frequency of 137.4 MHz.

Simple BBC-B Micro program to translate
Russian telemetry by Adrian Buchan, G6ZOJ

The line of numbers at the start of a telemetry frame on the Cosmos 1500, 1602, 1766, 1869 series of satellites is Moscow time in minutes in 24 hours (0000 to 1440), for example a telemetry frame from Cosmos 1869 for 08:19 GMT on the 13.9.87 read as follows:-

```
0679 < Moscow time in minutes
---- < grey scale step
0127
0025
0030
0000
0046
0000
0033
0000
0001
0002
```

Take the first group of numbers 0679, or 679 minutes from midnight Moscow time and convert it into hours and minutes (11:19). subtract 3 hours to convert from Moscow time to GMT gives 08:19 GMT.

This short program for the BBC-B converts the clock numbers into GMT.

```
10 CLS
20 PRINT" ENTER SPACECRAFT TIME ";
30 INPUT "",stime
40 H=stime DIV 60
50 M=stime MOD 60
60 H=H-3 MOD 24
70 IF H<0 THEN H=H+24
80 PRINT;" TIME (GMT "H; ": "M")"
90 GOTO 20
```

Understanding Russian Satellite Orbits

by Les G8LOK

Several members have phoned or written to me stating that they have great difficulty in keeping track of the Russian Meteor series of weather satellites, especially when no orbit data is available for them.

For ease of tracking one must admit that the Tiros NOAA satellites are very easy to come to grips with; one only leaves the receiver switched on, say between 12.00hrs and 14.00hrs and it will always be possible to get an ascending pass of NOAA 9: the next orbit is quite easily found by adding on the known period. The area covered is of course obvious from the mostly cloud free North African Cost.

METEOSAT TRANSMISSIONS VALID FROM 1ST AUGUST 1987

: A L L T I M E S G. M. T. CHANNEL 1 1694.5 MHz CHANNEL 2 1691.0 MHz :

HR>	00	01	02	03	04	05	06	07	08	09	10	11	
MIN													
2	E3					E8	E3	WEFA:		WEFA:	C3D AI	C9D	
6						E9		WEFA:	D1	WEFA:	C4D AI	D1	
10	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2	BIVW:D2	BIVW:D2	BIVW:D2	BIVW:D2	BIVW:D2	BIVW:
14	D1	D1	D1 T4	D1	D1	D1 A	CO2	DTOT:CO2 C2D	CO2 TO	CO2 C2D	CO2 C2D	CO2 A	
18	D3 AI	D3 AI	D3 AI	D3 AI	D3 AI	D3 AI	CO3	AIVH:CO3	AIVH:CO3	AIVH:CO3	AIVH:CO3	AIVH:CO3	AIVH:
22	D4 AI	AI	TO	D4 AI	E1 AI	A AI	D1	AIVH:C5D	AIVH:T4	AIVH:D1	AIVH:C5D	AIVH: A	AIVH:
26	D5 LY	AW	AI	D5	E2 AW	CO3	D3	AIVH:C6D	AIVH:	AIVH:D3	AIVH:C6D	AIVH:	AIVH:
30	D6 LR	AW		D6	DTOT:E3 AW		D4	LY D7		C2D	D4 DTOT:D7		C2D
34	D7 DTOT:		R R	D7	E4	R R	D5	LR D8	R R	D5	CTOT:D8	R R	
38	D8		R R	D8	E5	R R	D6	ETOT:D9	R R	D6	ETOT:D9	R R	
42	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2 BIW	D2	BIC D2	BIV D2	BIV D2	BIV D2	BIV D2	BIV
46	D9 LX	D1	D1	D9	D1	D1	CO2	LX CO2 C2D	CO2 C2D	CO2	CO2 C2D	CO2 AV	
50	D1 LX	D3 AI	D3 AI	D1 AI	D3 AI	D3 AI	CO3	LX CO3 AI	CO3 AI	CO3	CO3	CO3 AV	
54	D3 AI	AI	AI	D3 AI	E6 AI	E1 AI	C3D AI	C8D AI	T4 AI	C1D AI	C7D AI	E1 AV	
58	AI	WEFA:	CTH		E7	E2	C2D AI	C9D	T4	CTH C2D AI	C8D AI	E2 AV	

CHANNEL 2 TRANSMITS DIGITAL DATA TO PRIMARY USERS, SO FORMATS WITH A,B AND X FORMATS ARE NOT DECODABLE USING THE FRAMESTORE. FORMATS PREFIXED WITH "L" ARE TRANSMITTED FROM LANNION (FRANCE).

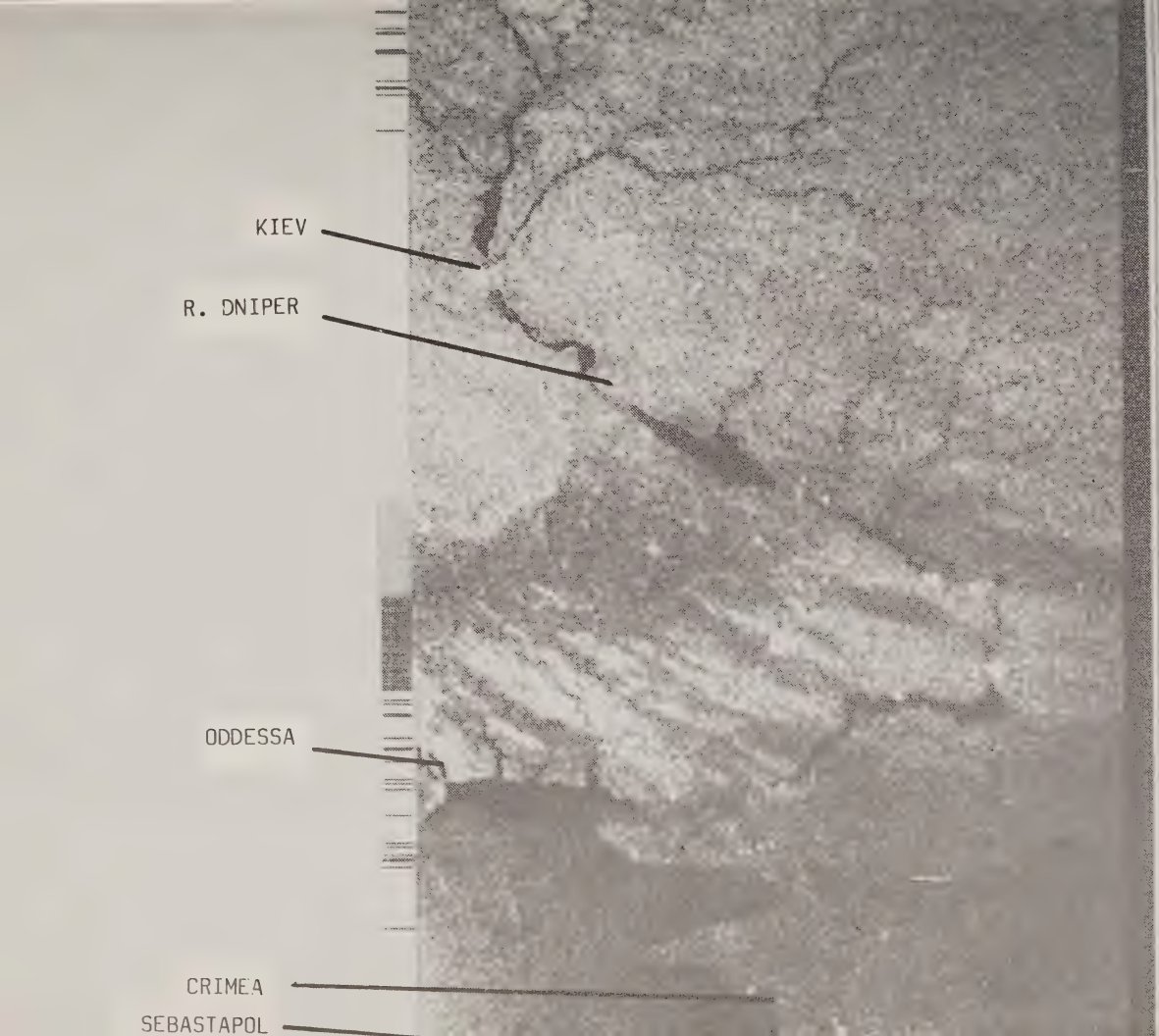
FORMATS "R" AND "Y" CONTAIN IMAGE DATA FROM THE INFRA-RED SENSOR ON BOARD THE GOES EAST SATELLITE, "R" FORMAT COVERS SOUTH AMERICA, AND THE "Y" SHOWS NORTH AMERICA, "Z" FORMAT FROM VISIBLE LIGHT SENSOR ON GOES EAST.

NOAA '9' 137.62MHz PERIOD 102.07432 INCR 25.5169729 DEG

1/10 333 13:40	30/10 355 15:10	30/11 346 14:37	30/12 340 14:14
2/10 330 13:29	31/10 352 14:59	1/12 190 04:13	31/12 184 03:51
3/10 353 15:00	1/11 350 14:48	1/12 343 14:26	31/12 337 14:03
4/10 350 14:49	2/11 347 14:37	2/12 187 04:02	1/01 181 03:40
5/10 348 14:38	3/11 344 14:27	2/12 341 14:15	1/01 334 13:52
6/10 345 14:27	4/11 188 04:03	3/12 185 03:52	2/01 331 13:41
7/10 189 04:04	4/11 341 14:16	3/12 338 14:04	3/01 354 15:13
7/10 342 14:16	5/11 185 03:52	4/12 182 03:41	4/01 351 15:02
8/10 186 03:53	5/11 339 14:05	4/12 335 13:53	5/01 349 14:51
8/10 339 14:05	6/11 183 03:41	5/12 332 13:42	6/01 346 14:40
9/10 184 03:42	6/11 336 13:54	6/12 355 15:13	7/01 190 04:16
9/10 337 13:54	7/11 333 13:43	7/12 352 15:02	7/01 343 14:29
10/10 181 03:31	8/11 330 13:32	8/12 349 14:51	8/01 187 04:05
10/10 334 13:43	9/11 353 15:03	9/12 347 14:40	8/01 340 14:18
11/10 331 13:32	10/11 350 14:52	10/12 344 14:29	9/01 185 03:54
12/10 354 15:03	11/11 348 14:41	11/12 188 04:06	9/01 338 14:07
13/10 351 14:53	12/11 345 14:30	11/12 341 14:18	10/01 182 03:43
14/10 348 14:42	13/11 189 04:07	12/12 185 03:55	10/01 335 13:56
15/10 346 14:31	13/11 342 14:19	12/12 338 14:07	11/01 332 13:45
16/10 190 04:07	14/11 186 03:56	13/12 183 03:44	12/01 355 15:16
16/10 343 14:20	14/11 339 14:08	13/12 336 13:56	13/01 352 15:05
17/10 187 03:56	15/11 183 03:45	14/12 333 13:45	14/01 349 14:54
17/10 340 14:09	15/11 336 13:57	15/12 330 13:35	15/01 347 14:43
18/10 184 03:45	16/11 181 03:34	16/12 353 15:06	16/01 344 14:32
18/10 337 13:58	16/11 334 13:46	17/12 350 14:55	17/01 188 04:09
19/10 181 03:34	17/11 331 13:35	18/12 347 14:44	17/01 341 14:21
19/10 334 13:47	18/11 354 15:06	19/12 345 14:33	18/01 185 03:58
20/10 332 13:36	19/11 351 14:55	20/12 189 04:09	18/01 338 14:10
21/10 354 15:07	20/11 348 14:44	20/12 342 14:22	19/01 182 03:47
22/10 352 14:56	21/11 345 14:33	21/12 186 03:58	19/01 336 13:59
23/10 349 14:45	22/11 190 04:10	21/12 339 14:11	20/01 333 13:48
24/10 346 14:34	22/11 343 14:22	22/12 183 03:47	21/01 330 13:37
25/10 190 04:11	23/11 187 03:59	22/12 336 14:00	22/01 353 15:08
25/10 343 14:23	23/11 340 14:11	23/12 334 13:49	23/01 350 14:57
26/10 188 04:00	24/11 184 03:48	24/12 331 13:38	24/01 347 14:47
26/10 341 14:12	24/11 337 14:01	25/12 354 15:09	25/01 344 14:36
27/10 185 03:49	25/11 181 03:37	26/12 351 14:58	26/01 189 04:12
27/10 338 14:01	25/11 334 13:50	27/12 348 14:47	26/01 342 14:25
28/10 182 03:38	26/11 332 13:39	28/12 345 14:36	27/01 186 04:01
28/10 335 13:50	27/11 354 15:10	29/12 189 04:13	27/01 339 14:14
29/10 332 13:39	28/11 352 14:59	29/12 343 14:25	28/01 183 03:50
30/10 330 13:28	29/11 349 14:48	30/12 187 04:02	28/01 336 14:03

All morning passes are southbound, all evening passes are northbound.

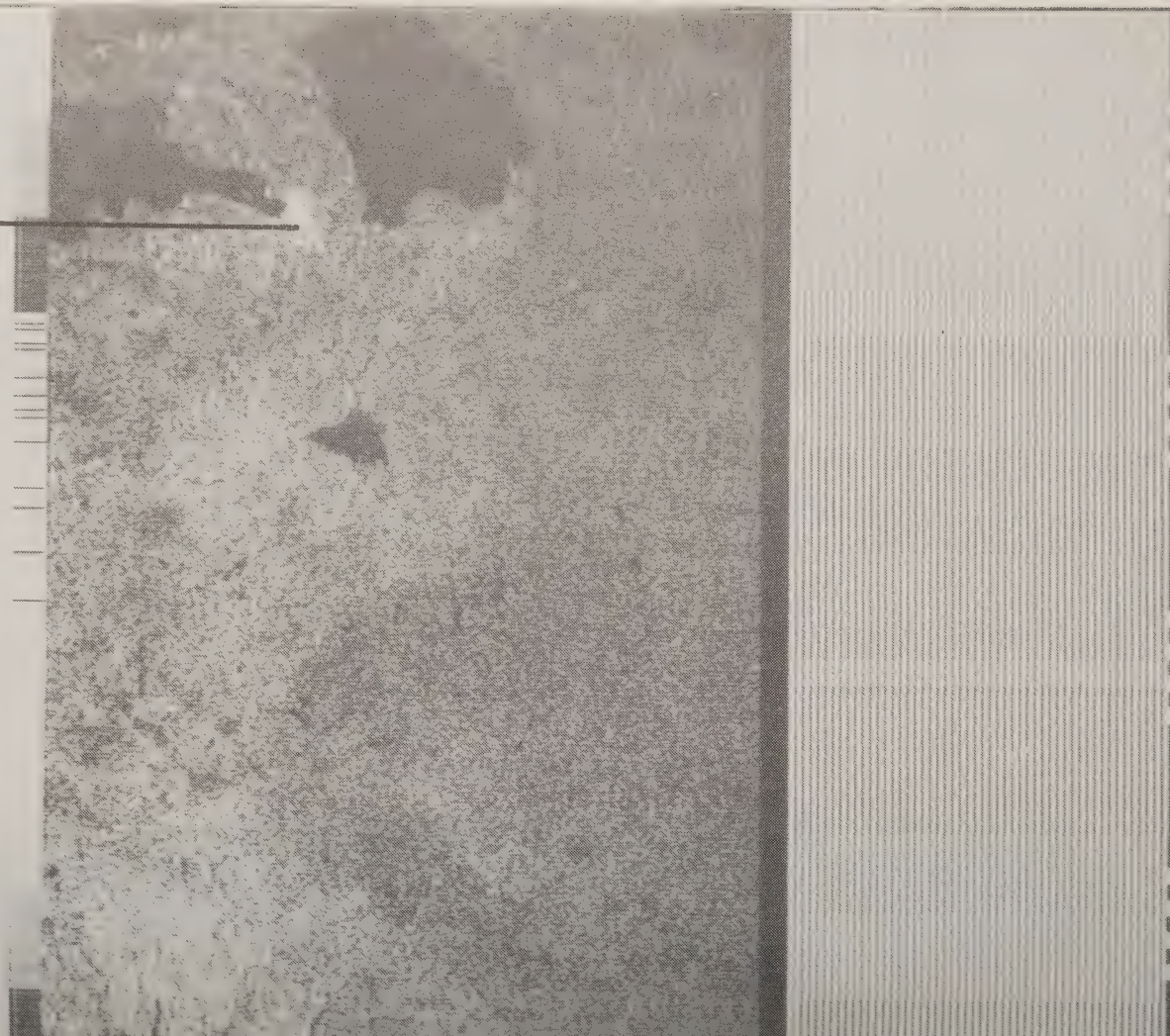
We have included some evening passes, which are about overhead UK.


KIEV
R. DNIPER
ODDESSA
CRIMEA
SEBASTAPOL

RUSSIAN RADAR PICTURE

24 APRIL 1987

22:59 GMT



NOAA '10' 137.50MHZ PERIOD 101.286595 INC 25.3214536 DEG

1/10	188	08:10	31/10	175	07:18	29/11	193	08:29	29/12	180	07:37
1/10	340	18:17	1/11	195	08:37	29/11	345	18:37	30/12	174	07:15
2/10	182	07:48	1/11	347	18:45	30/11	187	08:07	30/12	199	08:57
3/10	177	07:26	2/11	189	08:15	1/12	182	07:45	31/12	194	08:35
4/10	197	08:45	2/11	341	18:23	2/12	176	07:23	31/12	346	18:42
5/10	191	08:23	3/11	184	07:53	3/12	196	08:43	1/01	188	08:13
5/10	343	18:31	4/11	178	07:31	4/12	190	08:21	1/01	340	18:20
6/10	186	08:01	5/11	173	07:09	4/12	342	18:28	2/01	183	07:51
7/10	180	07:39	5/11	198	08:50	5/12	185	07:59	3/01	177	07:29
8/10	175	07:17	6/11	193	08:28	6/12	179	07:37	4/01	172	07:07
9/10	195	08:36	6/11	344	18:36	7/12	174	07:15	4/01	197	08:48
9/10	346	18:44	7/11	187	08:06	7/12	199	08:56	5/01	192	08:26
10/10	189	08:14	8/11	182	07:44	8/12	194	08:34	5/01	344	18:34
10/10	341	18:22	9/11	176	07:23	8/12	346	18:42	6/01	186	08:04
11/10	184	07:52	10/11	196	08:42	9/12	188	08:12	7/01	181	07:42
12/10	178	07:30	11/11	190	08:20	9/12	340	18:20	8/01	175	07:20
13/10	173	07:08	11/11	342	18:28	10/12	183	07:50	9/01	195	08:39
13/10	198	08:50	12/11	185	07:58	11/12	177	07:28	9/01	347	18:47
14/10	192	08:28	13/11	179	07:36	12/12	172	07:06	10/01	190	08:17
14/10	344	18:35	14/11	174	07:14	12/12	197	08:47	10/01	341	18:25
15/10	187	08:06	14/11	199	08:55	13/12	192	08:25	11/01	184	07:55
16/10	181	07:44	15/11	194	08:33	13/12	344	18:33	12/01	179	07:33
17/10	176	07:22	15/11	346	18:41	14/12	186	08:03	13/01	173	07:11
18/10	196	08:41	16/11	188	08:11	15/12	181	07:41	13/01	198	08:53
19/10	190	08:19	16/11	340	18:19	16/12	175	07:19	14/01	193	08:31
19/10	342	18:27	17/11	183	07:49	17/12	195	08:39	14/01	345	18:38
20/10	185	07:57	18/11	177	07:27	17/12	347	18:46	15/01	187	08:09
21/10	179	07:35	19/11	172	07:05	18/12	189	08:17	16/01	182	07:47
22/10	174	07:13	19/11	197	08:46	18/12	341	18:24	17/01	176	07:25
22/10	199	08:54	20/11	191	08:25	19/12	184	07:55	18/01	196	08:44
23/10	194	08:32	20/11	343	18:32	20/12	178	07:33	19/01	191	08:22
23/10	345	18:40	21/11	186	08:03	21/12	173	07:11	19/01	343	18:30
24/10	188	08:10	22/11	180	07:41	21/12	198	08:52	20/01	185	08:00
24/10	340	18:18	23/11	175	07:19	22/12	193	08:30	21/01	180	07:38
25/10	183	07:48	24/11	195	08:38	22/12	345	18:38	22/01	174	07:16
26/10	177	07:26	24/11	347	18:46	23/12	187	08:08	22/01	199	08:57
27/10	172	07:04	25/11	189	08:16	24/12	182	07:46	23/01	194	08:35
27/10	197	08:46	25/11	341	18:24	25/12	176	07:24	23/01	346	18:43
28/10	191	08:24	26/11	184	07:54	26/12	196	08:43	24/01	188	08:13
28/10	343	18:32	27/11	178	07:32	27/12	191	08:21	24/01	340	18:21
29/10	186	08:02	28/11	173	07:10	27/12	342	18:29	25/01	183	07:51
30/10	180	07:40	28/11	198	08:51	28/12	185	07:59	26/01	177	07:29

All morning passes are southbound, all evening passes are northbound.

We have included some evening passes, which are about overhead UK.

METEOSAT TRANSMISSIONS

: A L L T I M E S G. M. T. :

	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2
HR>	12		13		14		15		16		17		18		19		20		21		22		23	
MIN																								
2	E3		C3D	ETOT	C9D	C2D			WEFA	C3D		C9D		E3		C2D	E8							
6			C4D	LZ	D1				WEFA	C4D				D1			E9							
10	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIVW	D2	BIW	D2	BIW	D2	BIW	D2	BIW
14	CO2	DTOT	CO2	DTOT	CO2	T4	CO2	C2D	CO2	C2D	CO2	A	D1	DTOT	D1		D1	TO	D1		D1		D1	A
18	CO3	AIVH	CO3	AIVH	CO3	AIVH	CO3	AIVH	CO3	AIVH	CO3	AIVH	D3	AI	D3	AI	D3	AI	D3	AI	D3	AI	D3	AI
22	D1	AIVH	C5D	AIVH	TO	AIVH	D1	AIVH	C5D	AIVH	A	AIVH	D4	AI	E1	AI	T4	AI	D4	AI		AI	A	AI
26	D3	AIVH	C6D	AIVH		AIVH	D3	AIVH	C6D	AIVH		AIVH	D5	LY	E2	AW		WEFA	D5	DTOT		AW		
30	D4	LY	D7	C2D		C2D	D4	DTOT	D7	AW		C2D	D6	LR	E3	AW		WEFA	D6			AW		
34	D5	LR	D8	C8D	R	R	D5	ETOT	D8	AW	R	R	D7	WEFA	E4		R	R	D7				R	R
38	D6	CTOT	D9	C9D	R	R	D6		D9		R	R	D8	WEFA	E5		R	R	D8				R	R
42	D2	BIV	D2	BIV	D2	BIV	D2	BIV	D2	BIV	D2	BIV	D2	BIVW	D2	BIVW	D2	BIW	D2	BIW	D2	BIW	D2	BIW
46	CO2	LX	CO2	AW	CO2	C2D	CO2		CO2	C2D	D1	C2D	D9	LX	D1		D1		D9		D1		D1	
50	CO3	LX	CO3	AW	CO3	AI	CO3		CO3	AI	D3	AI	D1	LX	D3	AI	D3	AI	D1	AI	D3	AI	D3	AI
54	C1D	AI	C7D	AI		AI	C1D	AI	C7D	AI	E1	AI	D3	AI	E6	AI		AI	D3	AI		AI	E1	AI
58	C2D	AI	C8D	AI		CTH	C2D	AI	C8D		E2		AI	E7			CTH						E2	

T4 TEST TRANSMISSION CONTAINS 32 GREY LEVELS AND CAN BE USED FOR CALIBRATION. WHITE EQUALS GREY STEP 255, BLACK EQUALS STEP 0, ALL OTHER LEVELS ARE 17 STEPS DIFFERENT, TO TEST TRANSMISSION IS A STANDARD GEOMETRIC TEST PATTERN, AND CONTAINS GREY LEVELS, CIRCLES, FINE LINES AND DIFFERENT CHARACTER SIZES.

The reason for this ease of tracking is due to the satellite being launched in a Sun Synchronous orbit. Sun synchronous orbits are retrograde, i.e. with inclinations of more than 90 degrees and move in opposite direction to the rotation to the Earth.

By choosing the inclination and altitude the orbital path can be arranged to remain above a certain time zone, which in the case of NOAA 9 gives a near overhead pass in the mid-afternoon. Another benefit is that the orbit can be arranged so that it is always sunlight and enjoying maximum solar energy.

All the Meteor 2 and Meteor 3 series of weather satellites are launched in an orbit that is with the rotation of the Earth and with an inclination of less than 90 degrees. This change of inclination results in a pass that is several minutes earlier each day. As an example Met 2-15 would be, say, an overhead pass at 12.30 GMT on 10 AUG 87 but by 10 OCT 87 would be overhead at 6.40 GMT and possibly not switched on due to lack of illumination.

Another possible difficulty could be the lack of ground detail, but the North African Cost is always visible and should give viewers an approximate position on an ascending orbit to workout future passes.

May I suggest you read chapter 8 on satellite orbits in the following excellent book:-

The Satellite Experimenters Handbook.
available from Amsat U.K. or the R.S.G.B.

I hope the above explanations will be of help to our new members who are frustrated by successfully receiving a Meteor during the weekend break and after a brief period away, again switch on only to get nothing.

Meteor 30 is the only Russian weather satellite still transmitting in a Sun saynchronous orbit and can be received most days between 11.00 hours and 12.30 GMT, inclination 97.7 degrees.

KEPLER ELEMENTS provided by Mary Finean
EARTH SATELLITE RESEARCH UNIT, UNIVERSITY OF ASTON

	MET 3-1 137.85 MHz 85-100 A	MET 2-13 137.40 MHz 85-119 A	MET 1-30 137.06 MHz 80-051
EPOCH OF DATA	87248.62684646	87269.67158382	87248.79653148
ACCELERATION	0.00000043	0.00000006	0.00001176
REV NO	8989	8847	39418
INCLINATION	82.5473	82.5420	97.7224
R. A. NODE	335.7553	0.2864	335.9332
ECCENTRICITY	0.0020407	0.0014778	0.0040647
ARG OF PERIGEE	120.6552	266.6426	253.0692
MEAN ANOMALY	239.6564	93.3056	106.6072
MEAN MOTION	13.16929995	13.84026116	14.98174096

	COSMOS 1766 137.4 MHz 86-55 A	NOAA 9 137.62 MHz 84-123 A	NOAA 10 137.50 MHz 86-73 A
EPOCH OF DATA	87228.62278630	87265.99263770	87271.8785648
ACCELERATION	0.00000089	0.00000113	0.00000204
REV NO	5651	14311	5348
INCLINATION	82.5274	99.0608	98.7083
R. A. NODE	296.4632	232.5116	301.2333
ECCENTRICITY	0.0025455	0.0014819	0.0012667
ARG OF PERIGEE	115.3442	294.2185	267.2833
MEAN ANOMALY	245.0429	65.7432	92.6802
MEAN MOTION	14.73514967	14.11519530	14.22515680

	MET 2-15 137.85 MHz 87-001 A	MET 2-16 137.4 MHz 87-068	COSMOS 1869 137.4 Mhz 87-062
EPOCH OF DATA	87228.79510691	87262.71071530	87229.09271653
ACCELERATION	0.00000006	0.00000057	0.00000146
REV NO	3091	451	469
INCLINATION	82.4700	82.5601	82.5181
R. A. NODE	331.3974	3.7463	357.1209
ECCENTRICITY	0.0012712	0.0012093	0.0023805
ARG OF PERIGEE	345.5428	175.2595	182.5259
MEAN ANOMALY	14.5355	184.8692	177.5834
MEAN MOTION	13.83563970	13.83323145	14.73374467

MEMBERS LETTERS:

Lawrence Harris has been extremely active over the period since our last newsletter and has kept RIG updated by no less than 5 letters most of which are reproduced here. I am pleased (ed.) to receive and print these as they represent the views of somebody who has only relatvely recently got 'involved' with weather satellite imaging and is still on the big learning curve. His experiences, I believe can be representative of a wide body of RIG members who are just getting started and can relate to his experiences. To compliment this I am always attempting to encourage the 'elders' of the satellite observing game to give their input to the newsletter. Such effort has been rewarded this time with contributions from Geoff Perry MBE and David Bailey.

Lawrence Harris, 15th August:

Remote imaging-remotely

I have been watching so many weather satellite passes during the last several months that I have grown accustomed to the characteristics of my receiving system. I know that around Gibraltar I usually get drop outs, which I presume, are a function of my aerial, a Jaybeam crossed dipole, and its location, on the roof. Although my Southern and Western horizons are excellent I always get a bad telemetry over my South west for unknown reasons.

Today though I tried an experiment. I got batteries for the recorder and put connectors on the receiver, grabbed a UoSAT (!) dipole and set off for the moors with my son Tim! I parked the car at Yelverton, and connected the receiver to the car battery and set it up for a NOAA9 pass. The pass was exactly on time (using my home written software for my Amstrad CPC6128) and I was delighted with the signal strength, considering that the pass was only 40 degrees elevation.

I recorded the pass without any difficulty from horizon to horizon, followed immediately by Met 2/15 pass with similar results, low in the West. Normally I get poor results in the West; in fact I am experimenting with different aerial systems, and with encouraging preliminary results. This trip out with the equipment was very successful. I obtained significantly better data on the Eastern horizon and was able to see well into the black sea.

It does show that with little effort a trip just a few miles away from home can be very worth while. I shall now study my computer print outs for those passes that will reveal much more out on the moors than I can pick up at home .

Lawrence Harris, 25th August:

An Unusual Transmission.

Most of my spare time is taken up by monitoring the satellite bands for any signs of unusual activity, particularly new launches. I operate two receivers, one for the 145 MHz band and the other for the 137-139 MHz band.

On Tuesday August the 18th I was listening to the 137 band when I received a call from Adrian, G6ZOJ, advising me of the launch of a new Russian satellite. On returning to the receiver I found that I was picking up a new signal on 137.30 MHz loud and clear! This signal was not the normal APT format and I could not get a recognizable picture. After some ajustments of the framestore I did eventually get an image through it was ill-defined. The format was that of two adjacent pictures, the darker being just usable.

I reported this back to Adrian the next day and found that the mystery had deepened! The new satellite was on 137.40 MHz and broadcasting normal APT similar to Met 2 series, Adrain correctly concluding that it was Met 2/16. So what was I hearing on 137.30 MHz.

I played the tone over the phone to Adrain, who confirmed that others were now hearing the signal that I had first picked up on the day of launch of Met 2/16.

On Thursday the mystery was solved. Adrian had noticed that the early Met 2/3 satellite was also in the vicinity at the same time as the switch on of Met 2/16 over Russia; they had apparently inadvertently switched on at the same time!

Within a few days the 137.30 MHz signal had been switched off, leaving me wondering whether I am the proud owner of a unique record of Met 2/3's brief accidental resurrections!

Lawrence Harris, 11th August:

It is rare for me to be able to provide anyone with technical advice on construction of satellite receiving equipment etc but I believe I can advise on one problem.

I have assembled a number of N type plugs, coming in various shapes and sizes but all having one thing in common no instructions for their assembly! I have previously got by with what amounts to botch ups, since I have not been able to summon help from anyone, but in the case of my Meteosat cable which is just 2 metres long I have found a solution. The antenna is terminated with an N socket and the down converter is similarly terminated. Experience taught me that the continued removal and reconstruction quickly destroys the earth braid, but the perfect solution (for me) has been to use UR76 (low loss) cable fitted with BNC plugs, and use an N type to BNC connector at each end.

The result is a considerable improvement all round. The thinner cable is easier to feed indoors and the impedance match (50 ohms) is perfect.
The BNC plugs are a doddle to fit and there has been a great improvement in my systems performance. In fact I can now look at the CO2 (UK France and Spain) frame before going off to work taking just a few seconds to make the connection.

I hope this suggestion might be of some benefit to newcomers or others having difficulty with these confounded N plugs.
One final comment: I did also try UHF plugs and converters but they were a disaster. Although the plugs are easy to fit, their operation at 1700 MHz is not on, the mismatch is hopeless.

Lawrence Harris, 11 August:

Is there anyone in RIG who can help me with this technical problem. I have the framestore (YU3 version) and also an Amstrad CPC6128 computer. I am very keen to feed in the data to get pictures on the computer for further processing. I have been given the Maplin machine code program which requires their decoder, and it just doesn't work with the framestore.

Is there anyone in RIG who has done this? I believe that I have the tap-off points o.k, but you need to read in the data somehow and I simply don't know. If anyone can write to me with the answer I will be delighted to refund postage costs.

Lawrence Harris, 6th September:

Meteosat and the NOAA's are tried and trusted friends. The surprises come from the various Russian satellites which have continued to show activity during the summer.

Met 2-14 -

was operating normally through Spring, being off in eclipse and coming on in sunlight. It appeared to develop a fault on the 4-5 am pass on the 3rd May and during 1811z pass as it appeared to transmit a carrier only, however wiser folk than I identified Cosmos 1809 as interfering! Things were o.k. during later passes. C1809 was identified at a later time. However 2-14 was off by the 6th of May. Despite constant monitoring I didnt pick up 2-14 again untill June the 6th at 1427z. It remained o.k. up to the 11th July 1050z after which at about 1950z I found it transmitting carrier only, with an intermittent swish. By 2134z it was o.k.! Problems reappeared the next day and during the easterly passes I got the impression that it was being commanded while I watched. It was o.k. on 12/7 at 1103z. It has now been on ever since and produces very good cloud/snow detail and the sands of North Africa show very well.

Met 2-15 -

Operating continuously, have produced very good pictures with similar albedo content as 2-14. On the 18th May at 1313z it passed over a clear Greenland and I was able to identify beyond Denmarks Fjord. By late May land detail was visible. On 4th June 0932z Spain was easily seen, with sun glint on the Med looking very picturesque. Like 2-14 the resolution at maximum scan rate is very good and clouds reveal all their structure.

Met 2-16 -

Following an alert from Adrian (Brixham) with the news of a new launch I immediately picked up a new signal on 137.30 MHz but did not receive 2-16 until the night of 20th August, on 137.40 MHz. My first daytime pass showed a typical picture format. Pictures have been transmitted normally since launch.

Met 30 -

During the height of the summer the resolved detail actually decreased. I confirm that by playing an archived winter image which shows considerably more detail than the summer ones. For such an aged satellite it has operated continuously without problems.

Are there any experts who can describe its scanning system in a future issue of RIG? It continues to transmit on easterly passes up to a evaluation of about 65 degrees with an occasional good close up of the UK.

Met 2-3 -

It appears that this was accidentally switched on during the launch phase of 2-16 and I picked it up at 1630z on 18th August. I had difficulty in decoding the slow scan telemetry but my son Tim managed to build a clock reference to get a frame. There was some detail in the dark field but none seen in the whiter field. My experience doesn't go back far enough to hazard a guess as to what I was looking at. I received regular telemetry from 2-3 until on 21st August at 1504z and 1943z when it transmitted carrier only. I haven't heard it since then.

Cosmos 1766 -

I have seen a number of passes, often very good. On the 8th July the Leningrad area was clearly identified. Another pass on the 18th July reached 23 degrees elevation Nothing was identifiable. On the 20th July it was picked up in Lapland and followed clearly down to the Black Sea. Other passes were also very good.

Cosmos 1869 -

My first picture from this was on the 25th July at 1514z. Received pictures later including on the 2nd of August 1355z followed from Norway down to Istanbul. On the 10th August the picture format was changed and on the 11th a long picture was transmitted including a second image on the left which was identifiable as the Aegean Sea (weather radar or microwave I do not know). Again on the 14th there was a dual picture including a microwave sounder. More pictures received since then.

THE INFOTECH BOARD by Stan Ames

If you already own a BBC computer with a disc drive, then the Infotech board at £34.00 has got to be the cheapest way of decoding satellite images currently available. The unit will decode signals from the NOAAs, Meteosat and Russian Meteors. I have visited Chris Meadows, it's designer, who showed me the system and put it through it's paces. It seems well suited to the beginner with little or no previous electronics construction experience and with some familiarity with the BBC computer.

What do you get? You get a ready and tested interface board which will connect your BBC with any of the current satellite receivers. You also get a set of printed instructions plus a floppy disc with software to acquire images, display them on a monitor screen and save them to a disc.

What do you need to make it work? In addition to owning a BBC computer with disc system and satellite receiver, you will need to be able to perform a little simple soldering to connect 9 wires to pins on the board. The board is supplied with a plug to fit the BBC user port which receives the digitized data and supplies the board with its power. You will need to supply and fit 2 simple switches and a lead to accept audio signals either from a satellite receiver or a tape recorder. The audio input required is the same as the YU3UMV framestore so it will work with all the existing receivers.

How do you operate it ? Anyone who has used a BBC should be able to load up and run the menu and driven software. Audio signals are fed into the system to produce a screen display. Using simple commands, the displayed images can be loaded onto disc and later retrieved. Some skill is needed in centering the image using the "slip" button which sometimes appears to drive the image to one side of the screen or the other.

What sort of pictures will it produce? For £34.00 one would not expect to get the kind of pictures produced by Les Currington, James Brown and others for our centerfold. You will however get pictures in 4 grey levels or 4 colours depending on your monitor. Sea/Land interfaces show up very clearly as does cloud cover, but the small number of grey levels severely limits the amount of texture availble and gives a mosaic- like effect in some areas of the picture. There is no hard copy facility provided in this package but it would be a very simple matter to use a printer dump ROM or a software dump routine to transfer the images to a dot matrix printer.

If you already have a beeb and are thinking of having a go at getting your own images this might be a good place to start. But be warned: if you get hooked on satellite imaging (and many of us have), then you will almost certainly want to upgrade to something which gives better images,such as the YU3UMV design. On that subject Chris says that Infotech have a more advanced system on the cards combining the picture quality of the YU3UMV framestore and disc storage via a BBC. We wait with interest.

WALLOPS LIGHTNING STRIKE.

The Wallops CDA (command & data aquisition) Station experienced multiple (at least 3) lightning strikes at about 7.15 Daylight Saving Time on June 9th, 1987 causing significant damage to all 6 GOES antenna systems plus subsystems of other GOES equipment. The outages caused the loss of all GOES -East images from 7.30 p.m. to 1.00 a.m. and all GOES- West images from 7.15 p.m. untill 4:15 a.m. This is the worst lightning strike the station has received in its 18 year history. The lightning made a direct hit on one of the antennas and also hit the power lines which feed all the stations ground systems. The station is protected from lightning by lightning rods, an extensive grounding system and surge protectors. The initial theory as to why the lightning was able to do so much damage is that it hit the power lines down stream of the surge protectors and actually went in multiple directions hitting the surge protectors from the opposite side causing them to fail.

Wallops CDA employees made temporary fixes to transmitters and receivers in the antennas and manually repoistioned the antennas using hand cranks to restore data. Damage assessment is on going and repairs to redundant systems continue today.

(Note: One 24ft antenna was able to sustain Central Wefax and DCS through GOES-5 during the entire outage period).

Reproduced from the NOAA bulletin board.

Dear Phil,

Here is a small item of news re the appearance of signals from Met 2-3 on the 19.8.87, and my theory on how it was activated. The Russians launched Meteor 2-16 from Plesetask on the 18.8.87 at approximately 02.27 GMT and it was received at this location for the first time at 14.49 GMT on 137.40 Mhz, at approximately 16.30 GMT Lawrence Harris received the first signals on 137.30 Mhz of what appeared to be Meteor IR transmissions, times of AOS and LOS where reported to Geoff Perry of the Kettering group and an excellent piece of detection work by Peter Wakelin also of the Kettering group resulted in them being identified as coming from Meteor 2-3 (77 117A).

Analysis of the orbit of Meteor 2-3 and Meteor 2-16 for the 18.8.87 from 12.00 to 14.00 GMT will show that both spacecraft are visible to the Russian control stations simultaneously, assuming the Russians are using a VHF command link (NOAA use 148.56 Mhz to command the TIROS-N Spacecraft) Meteor 2-3 would certainly receive the command signals sent to Meteor 2-16 sometimes between Rev 1 and Rev 7 due to the beam width of the ground command antenna at this frequency. The most favorable time for this to occur at 07.47 GMT (AOS at Novosibrisk) although it is still possible on later orbits (AOS at Moscow).

Taking into account the design age of the Meteor 2 Spacecraft I think it is a mistake to assume that the command system is of a sophisticated nature, it is probable that it uses a group of simple access codes which are now being repeated on later spacecraft, bearing in mind the continuing problems (line jitter and failure of the sync tone burst) associated with these spacecraft we can assume they are basically the same now as they were at the start of the series.

Further evidence in support of this theory came on the afternoon of the 19.8.87 when IR transmissions from Meteor 2-3 where seen for the last time at this location on Rev 49714 at 18.01 to 18.13 GMT, on Rev 49715 19.47 to 19.52 GMT the spacecraft was transmitting an unmodulated carrier only.
Analysis of the orbit of Meteor 2-3 from 18.13 to 19.47 GMT shows it to be in range of Khabrovsk from 19.22 to 19.32 GMT in a North bound orbit with Meteor 2-16 below the horizon, have the Russians had to wait until Meteor 2-16 is out of range before attempting to switch off Meteor 2-3 ?
After 10 years in orbit the batteries on board the Meteor 2-3 must be at best in poor condition, but as Geoff Perry points out Meteor 2-3 was in a " solar orbit (an orbit that never enters the Earths shadow) at the time, which was at its maximum on the 18th August,

and it would have continuous power from its solar array which would explain the carrier received by John Murray from Meteor 2-3 at 15.22 UTC on the 12th August, Geoff Perry explains that a solar orbit is at its maximum when the right ascensions of the sun and the Meteor 2-3 orbit differ by 90 degrees, and this occurs at 94.5 day intervals therefore we should monitor 137.30 Mhz around the 24th November, the next time this will occur.

Adrian Buchan G6ZOJ

Dear Phil,

After building the framestore and completing the conversion to Meteosat the following problem arose. It may be due to component value tolerances but the solution may help others.

The problem showed on the automatic start stop frequencies 300 Hz and 840Hz. The PLL were set up using a signal generator and frequency meter but still would not work. An oscilloscope proved that audio was getting to the devices. I could trigger by using the Sig gen applied to the audio input.

The problem was finally traced to too lower a level being applied. If the input level pot was turned up to almost white out then the detectors started to work.

If this is the case then more gain has to be found. The G8LOK board has a LM741 that will provide extra gain. The modification is as follows:-

On board one of the framestore I removed the 100n capacitor to the right of the IC I114. This connects the tone detectors to the pot R107. Locate on the G8LOK board the LM741. A 47 n capacitor is connected to the output. Located to the right of the LM741 next to a 15K resistor. This where the audio level going to be collected from. Connect a wire from the capacitor and any side and take it to the framestore board 1. Connect the new audio wire to pin three of one of the tone detectors or use the hole left by the 100n capacitor nearest the front edge.

It should now be possible to start and stop on Meteosat with better reliability. NOAA passes etc are not effected by the modification.

It has also been observed that a recording made of the Meteosat to test the start stop operation failed due to motor speed variations. The image will be o.k. if replayed and manually started with out any sync problems. So use a good quality recorder or test off air when setting up the above.

FAX MACHINE COPY

Enclosed is a FAX attempt of a Meteosat picture. The FAX machine is a Plessey remote writer. The detail is not to good yet but I am working at it. The machine is normally 240 LPM but this produces a very small printout of nearly four images. I have removed one stylus and the image size has increased. Each pen is now at 180 degrees to the other on the belt. The paper is electrostatic with toner developer.

The other picture is taken of air from the Northwood transmitter for the fleet on 4.2470 MHz approximately. The signal is very strong and sends detailed weather charts, NOAA pictures, wind and current information.

Mike Mansfield, G6AWD.

Dear Phil,

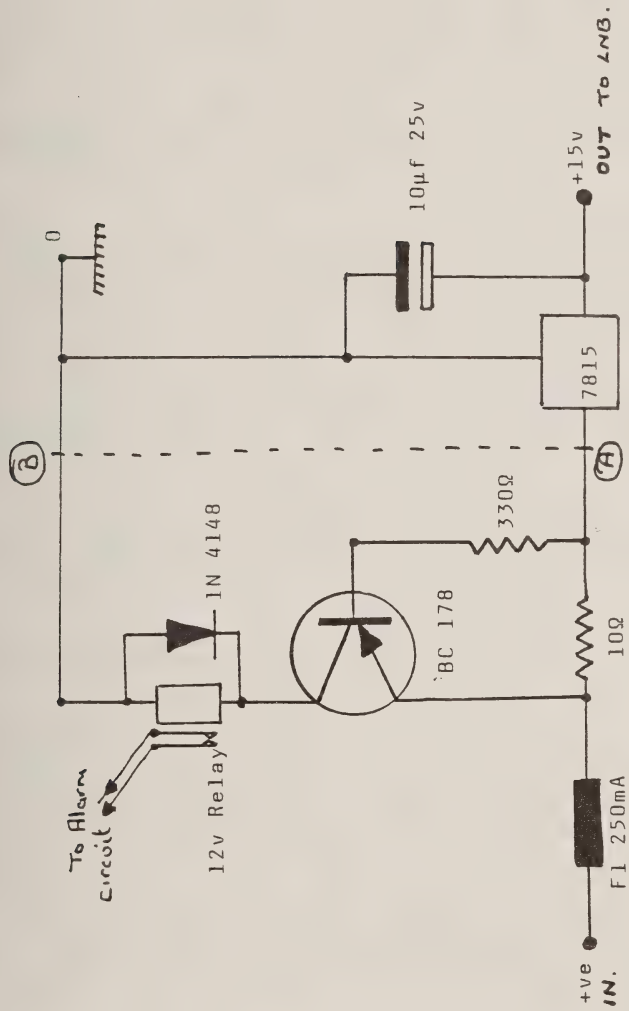
Many thanks for Newsletter 9, and especially your proposed section on T.V. Sats.

I am employed by the Institute of Higher Education in Doncaster and am responsible for the Satellite Receiving Station. Our 2m dish is located on a flat roof about 30 feet from the ground. A few months ago the ineveitable happened, someone stole our Low Noise Block Converter. A new one was hastily purchased but we were reluctant to fit it without some sort of protection. The circuit used may not be original but certainly works, and has been for the last 12 weeks on continuously.

The circuit consists of a current sensing device, a 10 ohm resistor. When the voltage drops below about 0.7v ie when the LNB is disconnected the relay will be de-energised. The relay will also be de-energised if the down lead from the LNB is cut or short circuited, this causes the 250mA fuse to blow. The circuit can be incorporated into the receiver ie connect in series with the LNB supply voltage or as a stand alone unit with its own built in voltage regulator.

The circuit is very sensitive and virtually foolproof! It can also be used in many applications, such as connecting in series with mast head amplifiers the circuit would activate if the antenna became disconnected or if the amplifier were to produce a fault ie open or short circuit.

The circuit is very simple to construct and highly recommended to install, as Sat T.V. takes off the market will be open for the thief to offer stolen dishes and LNB's to the public. Be warned if he wants it he will try and get it so from our experience ALARM IT.....



THE CIRCUIT SHOULD BE INSTALLED IN THE POWER SUPPLY LINE TO THE LNB WITHIN THE 'INDOOR UNIT' OF THE SYSTEM AND IS THEREFORE SELF-POWERED

N.B. THE 7815 REGULATOR IS PROBABLY NOT REQUIRED WHEN USED WITH AN EXISTING RECEIVER SET UP.

CIRCUIT FOR LNB ALARM

RON Broadbent, Secretary of AMSAT-UK
replies to Ivan Clines Criticsms in RIG 9.

During the time that Ivan was a member of this Organization I received one letter from him complaining that the contents of Oscar News were "to technical", to which I replied that I was very willing to put into Oscar News that material the majority of our members wanted, and which every week, with some 150 pieces of mail they told me their requirements. I also stated to Ivan that if he had some ideas as to the level at which we should pitch our magazine so that it pleased everyone who read it or, if he put some non-technical or low technical item that I could print to help our new members to overcome the hurdle that he previously found himself up against.

As usual in such cases I received no reply, and Ivan did not renew the following year. However, from time to time Ivan does come onto the AMSTAT UK nets, at which he is welcome, but I notice that he is still asking the same questions that he did 5 years ago. It would appear to my simple non Maths non Astro, but purely practical mind that some degree of technical learning would not come amiss. This would help all of us to understand this hobby of Amateur Radio which is by International definition "For self training and technical advancement" His Amateur Radio License goes part of the way to say what the ITU, Geneva Conference state in more definite terms. Again, if there are only "comic cuts" without technical articles how can one expect to learn any subject. I used to read the "Beano" 50 odd years ago, but did not learn much out of it. And so one could go on.

I would refer Ivan, through the RIG Newsletter, to take a leaf out of TWO (sorry three) well known callsigns on the Net that we hold on 80 meters. One has spent all his working life in Insurance, is over 70 years old, one a G4 with an ordinary up bringing non technical job all his life, 77 years of age, and the other who is 80 years old next month, although with no formal training retired a Senior Engineer of a multi national company. All of these Gents are still thirsting for knowledge. And building very fine equipment at this time. The equipment that Ivan may have built when he first got his license 30 years ago, certainly contained items that one respected old gent desgined from his technical approach reading what his forebears found out and wrote in " magazines". I suspect that Ivan finds 'RadCom"'too technical and wants to go back to 'how I used a Neon tube to find the Metre band'.

Finally Ivan, although you have a perfect right to stay technically stagnant, please do not malign other magazines and it's editor unless you are prepared to put your money where your mouth is, and make concrete suggestions. Better yet give some of us lesser mortals some of your pearls of wisdom and suggest the audience to whom we should pitch Oscar News.

I would of course given your answer in Oscar News if you had been one of our 3,000 plus members who take the trouble to send us a donation for the service that they really do enjoy.

Dear Phil,

Dartcom Meteosat Converter.

For readers wishing to receive Meteosat transmissions I can recommend the down converter from Dartcom as supplied by RIG. I purchased the basic tested module and was impressed by the quality of construction of the unit and the clear instructions which accompanied it. The unit provided trouble free operation from the outset used in conjunction with a RIG dish and an AR2001 receiver plus framestore. Pictures obtained are fairly noise free despite using a coffee tin for the feed horn and having the dish behind the glass of a south facing window.

Readers who find difficulty in accommodating a dish outside (or even inside) their dwellings may want to try Yagi alternative for 1.6 GHz available from JVL Electronics (0705 464482), potential problems however are its length (3 meters) and price at around £75.00 I have not tried this aerial and cannot comment on its effectiveness (the gain is I believe, 24dBi).

Anyone who wishes to see "live" Meteosat pictures of Europe and North Africa should visit the foyer (ask at security first) of the Meteorological Office, Bracknell where an computer animated display of successive scenes can be viewed. The screen next to the Meteosat display is interesting as it shows colour output from the "Rain Radar".

Bob Needham.

MEMBERS ADS
For Sale.

Un started project R.I.G. Framestore set of three PCB's with LOK sync, 6 memory IC's + 18 other IC's and nearly all resistors , caps, switches, etc. £45.00

Ben G4BXD Phone 0562 743253.

For Sale, Bob Sansoni has been in touch to say he has a number of 1.6 metre dishes available to RIG members. These became surplus to requirements on a particular order. They are painted and have a ring of 6 mounting holes already drilled. They will have to be collected from the Leeds area or buyer pays transport/insurance costs. Cost likely to be £87. Enquiries to the editor enclosing a sae for forwarding to Bob. Send no money at this time.

MANUAL AND SPARES FROM SCRAPPED PLESSEY KD111 FAX TRANSCEIVER
Suitable p&p required, or S.A.E. for enquiry

G.P. Smith G1JVZ, 59, Albion Street. Mansfield, Notts NG19 7AX.

MUIRHEAD K400/401 machines for sale:

Brian Weeks has purchased a large number of scrap Muirhead K400/401 Tx/Rx Fax machines. In January or February he intends to break them up and sell them for scrap. He is willing in the meantime to sell them to RIG members for £25 a Rx/Tx pair. Some of the machines are type D and D/R (capable of picture neg or pos) which rotate at 180 rpm and as you should know are absoulutely ideal for modifying for either Bracknell/NOAA or for Meteosat picture display.

Some machines are type B (500 rpm) not so useful but still have all the necessary mechanics. The machines are untested but beleived working, reasonably clean with no parts missing or broken.

Interested parties are asked as Brian is often working away, and to save his wife being bothered with phone calls of a technical nature that they should write to the address below:-

Brian Weeks, Nash Inning Video, OMBERSLY. WORCS.

Buyer obviously collects or pays packing/carriage

WEATHER SATELLITE AND OTHER REMOTE SENSING PUBLICATIONS

My xyl has now been appointed as an authorised distributor for the National Remote Sensing Centre and can offer a members discount on some items. Please state that you are a RIG member when ordering and although most items are delivered from stock please give us your Christmas orders as early as possible.(Don't forget to show the list to your nearest and dearest!)

	PRICE memb.	non-memb.
BOOKS:		
Britain from Space. Colour Landsat Images & maps	11.95	12.50
Images of the World.Satellite image Atlas	12.30	12.95
Images of the Earth. Probably our best "glossy", Has to be seen.Various satellites + shuttle:	12.30	12.95
Sourcebook of Remote Sensing. Guide to products, facilities etc. Very useful for the enthusiast:	14.25	15.00
Weather Satellite Reception. by Chris Hornby. A Guide for Starters	8.75	9.75
POSTERS AND TEACHING MATERIALS.(All posters in colour.)		
Meteosat Whole disc. 400x600	2.37	2.50
British Isles.Landsat. 480x710	4.45	4.25
Europe by Satellite.NOAA HRPT. Superb.590x780	4.70	4.95
Isle of Lewis.Landsat Thermal. Double sided.660x810	6.20	6.50
Satellite images.(1 large,6 small charts + booklet)	4.40	4.60
Satellites: Composite poster + booklet	4.40	4.60
Satpack 1 & 2: NOAA images with interpretation. ea:	2.40	2.40
PRINTS:Colour gloss resolution up to 200million pixels per pic!		
Small (Landsat 195x250,Meteosat 215x200)	9.25	9.75
Large (Landsat 475x360,Meteosat 355x360)	19.50	18.50
Small framed: Meteosat black,Landsat oak	15.00	15.75
Large framed: As above.	25.50	26.95
(Whole disc Meteosat.British Isles,Ireland,Scotland:Landsat)		
VIDEOS: All videos £51.75 or £10.00(+10.00 dep. +1.00p&p) hire.		
An Introduction to Satellite Remote Sensing. 35 minutes		
Towards a Greener Planet. Interpretation of images. 20 minutes.		
Remote Sensing, Coastal and marine applications. 20 minutes.		
NRSC image processing, coming soon.		
SLIDES:		
Remote Sensing: Coastal Processes. 18slides +booklet	8.50	8.95
Remote sensing: Applications in Geology	8.50	8.95
Remote Sensing: An introduction. 26 slides + booklet	9.50	9.95

*Orders under £35 p&p £2.00, over £35 p&p free.
*Orders over £50 free inflatable globe!

SPACETECH. 21 West Wools, Portland, Dorset DT5 2EA.
Tel.0305 822753

73 de Chris G4RAK.

Meteosat Downconverter - Fully described in RIG 8:-

a). Assembled and tested module in tin plate box:-
£129.69 + £1.00 p&p.

b). Complete mounted in weather proof box:-
£157.96 + £2.00 p&p.
Waterproof power and channel change connector £10.00 extra if required.

The RIG Receiver module is proving to be very popular with members and is still available from the secretary. The full specification was printed in RIG 5, but briefly the spec. is:

136 - 138 MHz Scanning receiver module
Sensitivity 0.2uV for 12 db SINAD at 10 kHz deviation
IF bandwidth 50 kHz
Audio tailoring specically designed for weather sats.

Built and aligned PCB together with
LED channel display module, Molex PCB connectors
and optionally, a full frequency LCD readout.

Basic module with channel display	£99.75
as above with LCD frequency display	£138.77

Prices includes packing and recorded delivery.
Cheques for above items payable to "DARTCOM".

The RIG VHF preamp also available includes a bandpass filter and is ideal for masthead mounting. The spec. was printed in RIG 7. It is available from the secretary as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches).

Module including first class post £13.37

Other items:

A-D module for superb grey levels on the framestore	£18.86
1 Metre Spun aluminium dish ideal for Meteosat	£34.00
Tubular feed horn with tripod mount for dish above	£33.73
3 Point mount for dish to a vertical pole	£22.00

Cheques payable to "Remote Imaging Group" please

Anybody requiring PCBs should contact the secretary, G8XTW.

SPECIALIST IN CLOSED CIRCUIT VIDEO SYSTEMS

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:(061) 790-4649

34,WITHINGTON DRIVE, ASTLEY, MANCHESTER, M29 7NW.

NEW AND SECOND HAND SURVEILANCE EQUIPEMENT

CAMERA'S

All cameras come complete with standard 16mm lenses except low light camaras. If a wide angle lense is preferred instead of a standard there will be an extra charge of £10.00

National wv 1000	£55.00
Hitachi HV 62	£55.00
Baxall 12volt	£50.00
Baxall mains	£55.00
Sharp IT-35CZ	£50.00
RCA vidicon	£65.00
RCA ultracon **	£110.00
RCA nuvicon **	£110.00

**Low light cameras require auto iris lenses £10.00 discount if bought with camera.

MONITORS

Second hand from £45 to £60 for standard 9" 12" & 17"monitors

RING FOR AVAILABILITY

VIDEO SWITCHES

FROM £15 TO £50

LENSES

16mm S/H	£7.50
8 mm S/H	£18.00
8 mm new	P.O.A.
8 mm auto iris s/h	£35.00
16mm auto iris s/h	£35.00
25mm auto iris s/h	£45.00
Motorised zooms as availiable	P.O.A.
Camera brackets from	£5.00
Outside housing's when availiable	P.O.A.

IF ITS NOT LISTED RING

Proprietor's: Mr. S. P. Daniels, L.I.CERAM. Mr. J. Fraser

Weather Satellite Kits & Systems

BBC MICRO-BASED WEATHER STATION

Comprising interface card and WXSAT software package. Used with the MSR20 receiver or similar, gives superb results at a realistic price! Some of the many features include:-

- Zoom - X2, X4, X8
- Greyscale Control - for visual or I.R.
- User-defined colour palette
- North/South picture invert facility
- Printer dump for hard copies
- Fast X-Y picture scrole
- WEFAX compatible

The MSS20 can be assembled in an evening, and comes complete with test tape for easy instant alignment!

£3 buys you a demonstration disc of typical pictures (refundable). State 40/80 track.

[The MSS20 system offers really excellent performance, and should not be confused with other BBC-based systems from elsewhere which are no comparison].

£59.95 incl.

YU3UMV FRAME STORE KIT

All components to populate the PCBs (which are available from Phil. Seaford).

64k Memory £68.71 incl.
256k Memory £78.37 incl.

LOK SYNC BOARD KIT

A complete kit of parts to populate the PCB (available from Phil. Seaford)

£25.85 incl.

MSM20 UNIVERSAL S-METER KIT

A completely new design offering greatly improved sensitivity for comparing weak signals, and having a logarithmic sclae to accomodate larger signals. Operates from any IF frequency between 455KHz and 18MHz.
The module will also drive a centre-zero meter for signal deviation - useful for monitoring Doppler shift, or receiver alignment.

£8.95 incl.

HIGH-RESOLUTION FRAME STORE

Our apologies to all those awaiting the appearance of the Hi-Res Frame Store. It will be announced very soon, and we do have a note of everyone who has expressed an interest. As recognition of their patience, all of those on our mail list will be offered the opportunity to purchase at a preferential price!

MSR20 VHF RECEIVER KIT

A high-performance, dual-conversion design optimized for low noise and high sensitivity. It incorporates audio mute, electronic channel switching, and facilities for the addition of channel scanners and S-meter.
Performance summary:-

RF Bandwidth (3dB)		2.5MHz
IF Bandwidth (3dB)		50KHz
IF Frequencies	(1st)	10.7MHz
	(2nd)	300KHz
Image Rejection Ratio		>100dB
Sensitivity (12dB quieting)		0.15uV
(fully ")		0.6uV
Supply Voltage		12v
Size		133 x 115 mm

The MSR20 is built onto a glass board with printed component overlay, and is accompanied by a comprehensive step-by-step instruction manual with layout and schematic diagrams.

£56.95 incl.

MSH20 RECEIVER HARDWARE KIT

A complete kit of parts to case and finish the MSR20. Includes metal case, mains transformer, switches, complete mains lead and IEC input socket, fuse, fuse-holder, knobs, rubber feet, screws, pillars etc.
Kit now also includes mains power supply components.

£14.30 incl.

MSA20 CROSSED-DIPOLE VHF AERIAL

A high-quality, well-finished, circular polarized custom-designed aerial. crossed-dipole elements with reflectors.

£24.95incl.
with built-in preamplifier £39.95incl.

MSK20 137MHz PREAMPLIFIER

A very low noise MOSFET preamp to give useful signal improvements where aerial-to-receiver runs of more than a few metres exist. The kit comes complete with diecast box and BNC connectors. It takes its power via the coaxial feed, avoiding the need for additional cable runs.

£10.95 incl.

ORDERING

All orders before 4.30pm despatched same day.
Cash, (cheques & PO) with order please.
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